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P54: SEX DIFFERENCES IN AMBULATORY CENTRAL BLOOD PRESSURE AND PULSE WAVE REFLECTIONS IN UNTREATED PATIENTS

Bernhard Hametner, Christopher Clemens Mayer, Katy Whitelegg, Thomas Weber, Peter Fitscha, Siegfried Wassertheurer

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Conclusions: In hypertensive patients age appears to be the major determinant of TOD, with central SBP, and marginally peripheral SBP, PWV and Alx, also playing a significant role. Our results suggest that estimation of 24-hour central hemodynamics and arterial stiffness in ambulatory conditions may help improve the individualized assessment of the BP-associated TOD.

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RENIN AT DIFFERENT PHYSICAL ACTIVITY LEVELS IN A BI-ETHNIC POPULATION: THE AFRICAN-PREDICT STUDY

Johannes van Rooyen ¹, Hugo Huisman ², Leonè Malan ², Catharina Mels ², Ruan Kruger ², Lebo Gafane-Matemané ², Shani Botha ², Alta Schutte ²
¹Hypertension in Africa Research Team (HART) and South African Medical Research Council (SaMRC) Unit for Hypertension and Cardiovascular Disease, South Africa

²Hypertension in Africa Research Team (HART) and South African Medical Research Council (SaMRC), South Africa

Background and objectives: It is widely accepted that regular physical exercise reduces the BP, particularly in hypertensive individuals. It is recommended in the prevention of hypertension to assist in BP control. The BP lowering mechanisms of exercise remain largely elusive, we therefore evaluated the RAAS as a regulator of arterial BP.

Methods: The sub-study was embedded in the African Prospective study on the Early Detection and Identification of Cardiovascular disease and Hypertension (African- PREDICT) and included 111 white and 99 black participants aged 20–30 years.

Office- and central blood pressure as well as other cardiovascular variables were measured. Renin was analysed with an ELISA- and aldosterone with a RIA kit.

Results: The BP decreased significantly in the white but not in the black participants when tertiles for physical activity levels were compared. The total renin (renin + prorenin) level decreased significantly from 789.2 to 700.0 pg/ml ($p = 0.04$) in the white but not in the black participants (821.6 to 806.6 pg/ml; $p = 0.84$) with high physical activity level. In multiple regression analysis, in the white participants, MAP and aldosterone contributed significantly and independently to the low renin in the third percentile for physical activity level. This was not evident in the black participants.

Conclusion: Only in white participants high physical activity levels were associated with decreased blood pressure and the RAAS may be an important mechanism in this regard.

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ARTERIAL STIFFNESS IN RELATION TO BIRTH CHARACTERISTICS IN THE JAMAICAN 1986 BIRTH COHORT

Nadia Bennett ¹, Trevor Ferguson ², Novie Younger-Coleman ², Marshall Tulloch-Reid ², Renee Walters ², Amanda Rousseau ², Janeil Williams ², Seeromanie Harding ³, J. Kennedy Cruickshank ³, Rainford Wilks ²

¹King's College, London, UK

²Caribbean Institute for Health Research, The University of the West Indies, Mona, Kingston, Jamaica

³Diabetes and Nutritional Sciences Division, School of Medicine, Kings College, London, UK

Background: We tested the association between birthweight and arterial stiffness measured by aortic pulse wave velocity (PWV) and cardio-ankle vascular index (CAVI) in a birth cohort of 30 year old Jamaicans.

Methods: Participants were from the 1986 Jamaica Birth Cohort. Arterial stiffness was measured as PWV using Arteriograph 24h™ and CAVI with VaSera™ devices. Current anthropometry (height, weight, waist and hip

circumference), and brachial blood pressure measures were linked to birthweight and other early life markers of CVD risk (birth-length and maternal height). Linear regression models were used for analysis.

Results: Analyses included 235 participants 44% male, with mean $\pm$ SD age 29.8 ± 0.7 years, birthweight 3.1 ± 0.0 kg, PWV 6.3 ± 0.1 m/s and CAVI 6.3 ± 0.1 . Bivariate models showed men had higher arterial stiffness ($p < 0.001$). Maternal height ($p = 0.031$), waist/hip ratio ($p = 0.019$), BMI ($p = < 0.001$) and blood pressure (systolic and diastolic) ($p < 0.001$) were associated with PWV, but only BMI ($p < 0.001$) was associated with CAVI. There was no association between birthweight and PWV or CAVI, $p = 0.38$ and $p = 0.41$ respectively. In multivariable models, associations between birthweight and PWV and CAVI did not change after controlling for gender, BMI, and SBP. Positive associations (coef $\pm$ SE) between PWV and BMI (0.03 ± 0.01 $p = < 0.01$) and SBP (0.03 ± 0.01 $p = 0.001$) remained significant; as did the negative associations for BMI and CAVI (-0.04 ± 0.01 $p < 0.001$).

Conclusion: Men had higher arterial stiffness even when controlling for blood pressure and the associations of blood pressure and BMI with PWV were positive whereas and BMI with CAVI was negative. Neither arterial stiffness measure was associated with birthweight.

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TETRAHYDROBIOPTERIN AND MARKERS OF OXIDATIVE STRESS IN A YOUNG BI-ETHNIC POPULATION: THE AFRICAN-PREDICT STUDY

Hugo Huisman ^{1,2}, Carina Mels ³, Johannes Van Rooyen ³, Ruan Kruger ³, Carla Fourie ³, Lebo Gafane ³, Wayne Smith ³, Alta Schutte ^{3,2}

¹Hypertension in Africa Research Team, North West University, South Africa

²MRC Research Unit for Hypertension and Cardiovascular Disease, North-West University, South Africa

³Hypertension in Africa Research Team (HART), North-West University, Potchefstroom, South Africa

Background/Objectives: Tetrahydrobiopterin (BH4) is a cofactor for nitric oxide synthase (NOS). Oxidative stress, reported in black populations (1), may lead to the oxidation of BH4, the uncoupling of eNOS, decreased NO and increased superoxide levels (2,3). We compared BH4 and markers of oxidative stress and their association, between black and white cohorts.

Methods: In the African-PREDICT study, we included black ($n = 300$) and white ($N = 297$) participants (aged 20–30 years). We measured blood pressure, and determined serum levels of BH4 and markers of oxidative stress.

Results: Blacks had higher blood pressure ($p < 0.001$). In blacks the following serum levels were lower: BH4 ($p < 0.0001$), total antioxidant status (TAS) ($p < 0.0001$), glutathione peroxidase (GPx), while reactive oxygen species (ROS) ($p < 0.03$) was higher. In blacks BH4 related positively with GPx in single, partial (adjusted for socio-economic status, sex, age, BMI, GGT and cotinine) and multiple regression ($R^2 = 0.16$, $\beta = 0.17$, $p = 0.02$) and glutathione reductase (GR) ($R^2 = 0.16$, $\beta = 0.15$, $p = 0.05$). We found a negative correlation between BH4 and GPx ($R^2 = 0.07$, $\beta = -0.26$, $p = 0.0006$) in whites.

Conclusions: Higher oxidative stress levels in young blacks (increased ROS, lower TAS and GPx) could explain the low concentrations of BH4, the possible uncoupling of eNOS, resulting in higher blood pressure. The uncoupling of eNOS may explain the production of ROS and peroxynitrite and may be linked to the positive correlation of BH4 with GPx and GR found in blacks, that may lead to early vascular changes.

Reference

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Poster Session I – Hypertension

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SEX DIFFERENCES IN AMBULATORY CENTRAL BLOOD PRESSURE AND PULSE WAVE REFLECTIONS IN UNTREATED PATIENTS

Bernhard Hametner ¹, Christopher Clemens Mayer ¹, Katy Whitelegg ¹, Thomas Weber ², Peter Fitscha ³, Siegfried Wassertheurer ¹

¹Center for Health & Bioresources, AIT Austrian Institute of Technology, Vienna, Austria

²Cardiology Department, Klinikum Wels-Grieskirchen, Wels, Austria

³Practice for Internal Medicine, Vienna, Austria

Objectives: Sex differences for parameters of arterial wave reflection and arterial stiffness were reported from single office measurements, but circadian patterns were not extensively investigated up to now. The aim of this study was to determine sex differences between day and night values of ambulatory central blood pressure as well as ambulatory pulse wave parameters related to arterial wave reflection.

Methods: A Mobil-O-Graph (IEM, Stolberg) with inbuilt PWA technology was used in patients without antihypertensive treatment visiting a doctor's practice for internal medicine. Aortic blood pressure was obtained using a generalized transfer function incorporating mean blood pressure for pressure calibration. Daytime was defined between 9 am and 8 pm and nighttime between 10 pm and 6 am.

Results: In the study 192 men (mean age 50.5 years) and 155 women (57.3 years) were included. Men had higher central systolic (cSBP) and diastolic blood pressures compared to women. In contrast, augmentation index (Alx) and reflection magnitude (RM) were significantly lower in men compared to women both during day and night. For both sexes, Alx and RM were higher during the night, see table for full details (all day-night differences were statistically significant).

Table	Mean values of both sexes during daytime and nighttime.			
	Day		Night	
	Men	Women	Men	Women
bSBP (mmHg)	134.5*	130.2	121.5	118.6
bDBP (mmHg)	86.7*	81.5	74.8*	70.3
HR (bpm)	75.2	77.1	64.5*	66.9
cSBP (mmHg)	136.7*	131.5	131.7*	125.4
Alx (%)	19.8*	28.2	25.1*	35.1
RM	60.5*	63.4	68.7*	71.4

* Indicates a significant difference between men and women ($p < 0.05$); bSBP – brachial systolic blood pressure, bDBP – brachial diastolic blood pressure, HR – heart rate, cSBP – central systolic blood pressure, Alx – augmentation index, RM – reflection magnitude.

Conclusions: A typical blood pressure dipping during nighttime was found for both sexes. However, an increase in wave reflection parameters was found during nighttime leading to highest values for women during the night. Thus, single measurements have to be interpreted with caution and an ambulatory blood pressure measurement including pulse wave analysis might be beneficial.

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TARGET ORGAN DAMAGE AND BLOOD PRESSURE VARIABILITY IN HYPERTENSION

Dimitrios Terentes-Printzios, Charalambos Vlachopoulos, Athanasios Angelis, Nikolaos Loakeimidis, Panagiotis Xaplanteris, Christos Georgakopoulos, Evangelia Sigala, Losif Koutagiar, Angeliki Rigatou, Dimitrios Tousoulis *Peripheral Vessels Unit, First Department of Cardiology, Hippokraton Hospital, Medical School, National and Kapodistrian University of Athens, Athens, Greece*

Purpose/Background/Objectives: Hypertension is associated with several markers of subclinical target organ damage (TOD). Short-term blood pressure variability (SBPV) is a prognostic factor for cardiovascular events in hypertensives. We hypothesised that there is a relationship between SBPV and TOD in never-treated hypertensives.

Methods: We enrolled 943 consecutive essential hypertensives (mean age 53 ± 12 years, 497 males). Markers of subclinical TOD [left ventricular mass index (LVMI), pulse wave velocity (PWV), total arterial compliance (TAC), aortic augmentation index (Alx@75), ankle-brachial index (ABI) and estimated glomerular filtration rate (eGFR)] and 24-h ambulatory blood pressure were evaluated in all patients. SBPV was calculated as follows: 1) SD of 24-hour, daytime, or nighttime SBP and 2) weighted SD of 24-hour SBP.

Results: In multivariable regression analysis, all four variables of SBPV exhibited significant association with LVMI ($p = 0.014$, $p = 0.002$, $p = 0.002$ and $p < 0.001$, respectively), PWV ($p = 0.021$, $p = 0.015$, $p = 0.055$ and $p = 0.006$, respectively) and TAC ($p = 0.048$, $p = 0.020$, $p = 0.036$ and

$p = 0.006$, respectively). In multivariable analysis, ABI and eGFR were not associated with indices of SBPV. We assessed TOD based on 2013 European Guidelines for Hypertension [left ventricular hypertrophy (LVMI $> 115 \text{ g/m}^2$ in men and $> 95 \text{ g/m}^2$ in women), increased PWV (PWV $> 10 \text{ m/s}$), increased Alx@75 (Alx@75 $> 28\%$), decreased ABI (ABI < 0.9) and decreased renal function (eGFR $< 60 \text{ ml/min}$)]. In multivariable logistic regression analysis, SBPV indices were not associated with markers of TOD ($P > 0.05$).

Conclusions: Our findings support a complex relationship between SBPV and TOD in hypertension. Specifically, SBPV is more closely related to markers of ventricular and vascular compliance than other markers of TOD in hypertension.

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ASSOCIATION BETWEEN URIC ACID AND CARDIAC, VASCULAR AND RENAL TARGET ORGAN DAMAGE IN HYPERTENSIVES SUBJECTS

Alessandro Maloberti ^{1,2}, Marisa Varrenti ^{3,2}, Nicola Trigione ^{1,2}, Lucia Occhi ^{1,2}, Francesco Panzeri ^{1,2}, Marta Alloni ², Luca Giupponi ^{1,2}, Paola Vallerio ², Matteo Casati ⁴, Guido Grassi ¹, Giuseppe Mancia ¹, Cristina Giannattasio ^{1,2}

¹Medicine and Surgery Department, Milano-Bicocca University, Milan, Italy

²Cardiology IV Unit, "A. De Gasperi" Department, Ospedale Niguarda Ca' Granda, Milan, Italy

³Medicine and Surgery Department, Milano-Bicocca University, Milan, Italy

⁴Biochemical Laboratory, San Gerardo Hospital, Monza, Italy

Background: To date no definitive results exist about the relationship of Serum Uric Acid (SUA) and TOD in HT subjects. We sought to determine if such an association exist between SUA and subclinical cardiac, vascular and renal alterations in HT.

Methods: We enrolled 632 consecutive outpatients, followed by the Hypertension Unit of S. Gerardo Hospital (Monza, Italy) affected by essential HT. We evaluated anamnestic data, clinical BP and laboratory data as well as TOD with cardiac echocardiography (both as LVMI and diastolic function – E/A), carotid ultrasound (IMT), arterial stiffness (PWV) and renal function analysis (creatinine and microalbuminuria).

Results: Age was 53.4 ± 12.7 years, SBP/DBP were 140.5 ± 18.8 and $85.1 \pm 13.1 \text{ mmHg}$ and SUA was $5.2 \pm 1.4 \text{ mg/dL}$. Regarding TOD mean LVMI was $109.6 \pm 31.4 \text{ g/m}^2$, IMT $0.71 \pm 0.1 \text{ mm}$, PWV $8.5 \pm 2.2 \text{ m/s}$, while creatinine and microalbuminuria were $0.8 \pm 0.2 \text{ mg/dL}$ and $25.4 \pm 126.1 \text{ mg/24h}$ respectively. When subjects were divided into high and low SUA group (depending on the median SUA of 5.2 mg/dL), with similar age and BP values the first group showed significantly higher values of metabolic index (BMI, HDL chol, triglycerides and glucose, $p < 0.001$), LVMI (117.1 ± 32.8 vs $102.1 \pm 28.1 \text{ g/m}^2$, $p < 0.01$), IMT (0.73 ± 0.1 vs $0.70 \pm 0.1 \text{ mm}$, $p = 0.04$), PWV (8.8 ± 2.4 vs $8.3 \pm 2.1 \text{ m/s}$, $p = 0.01$) and creatinine (0.9 ± 0.2 vs $0.7 \pm 0.1 \text{ mg/dL}$, $p < 0.01$) and lower E/A (1.0 ± 0.3 vs 1.1 ± 0.3 , $p < 0.01$). SUA showed significant correlation with sex, age, BMI, SBP, HDL chol, triglycerides, glucose, creatinine, IMT, LVMI and E/A. Regarding TOD only creatinine presents SUA as significant determinant in logistic regression analysis.

Conclusion: In HT, SUA values correlate with metabolic derangements and with cardiac, vascular and renal TOD. The most significant correlation is with renal damage.

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ASSESSMENT OF PULSE WAVE VELOCITY AND ASSOCIATION TO TARGET ORGAN DAMAGE IN TREATMENT-NAÏVE HYPERTENSIVE PATIENTS: A COMPARISON OF SPHYGMOCOR AND MOBIL-O-GRAPH

Enrique Rodilla, Jose Antonio Costa, Francisco Perez, Carmen Gonzalez, Jose Maria Pascual *Hospital de Sagunto, Valencia, Spain*

Introduction: Comparison of Mobil-O-Graph® with SphygmoCor® exclusively in treatment-naïve hypertensives has never been done. Aims of the study were to assess 1) intra-device agreement between both methods, 2) inter-device agreement between two surface measurements of SC (subtracted distance (cfPWVsub)) and direct distance $\times 0.8$ (cfPWV0.8)) with two patient's positions of MG (supine (supPWVestim)) and sitting (sitPWVestim)), 3) the strength of association between tonometric and oscillometric measures of PWV with target organ damage (TOD).